

# NATURAL HISTORY MISCELLANEA

Published by

The Chicago Academy of Sciences

Lincoln Park-2001 N. Clark St. Chicago 14, Illinois U.S.A.

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No. 188

March 15, 1969

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## Mammals of the Pine Hills-Wolf Lake-La Rue Swamp Complex

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On various occasions from 1950 to 1965, representatives of the Cooperative Wildlife Research Laboratory and, during 1951 to 1961, members of mammalogy classes, have collected mammals and recorded signs and observations in a 13.5-square mile area. It included all of sections 3, 4, 9, 10, 15, 16, 21, 22, 27, 28, 33 and 34 of T.11 S. and parts of sections 3 and 4 of T.12S., Union County, Illinois (Fig. 1) . This area, herein referred to as the Pine Hills-Wolf Lake-La Rue Swamp Complex, represents, in a relatively small area, a wide variety of habitats, not similarly duplicated elsewhere in Illinois. Numerous publications reflect the uniqueness of this region as to *flora* (Ashby and Kelting, 1963 ; Mohlenbrock and Engh, 1964; Mohlenbrock and Voigt, 1959 and 1965 ; Mohlenbrock and Weik, 1963) ; *herpeto f. fauna* (Rossman, 1960 ; Klimstra, 1959 ; Cagle, 1942) ; *fishes* (Gunning and Lewis, 1955) ; *mammals* (Layne, 1958) ; and *geology* (Leighton et al., 1948) . These reports amply describe potential mammalian habitats of this ecological complex ; hence, a general resume of the geological and floral characteristics will not be included in this paper. An attempt is made, however, to relate individual species to a specific habitat, when such precise relationship exists.

During this period of 16 years, 790 dates of trapping and/or observing were recorded, including every month of the year. The work is based on almost 26,000 trap nights using the Museum Special trap. During December, 1959, through July, 1961, there was continuous trapping and observing, representing nearly 18,000 trap nights. Each month of the year was included during this time, with trapping periods of one to five nights per month. Mammalogy class field trips yielded a total of 4900 trap nights for eight periods, usually in October (1951, 1953, 1954, **1956, 1957, 1958, 1960, 1961**) . From July through September, 1959, and June, 1960, through July, 1961, almost daily visitation was made to **various parts** of this ecological complex in special research projects.

As a result of the efforts indicated above, 41 of the 59 species of mammals recorded **for Illinois were observed, collected or identified**

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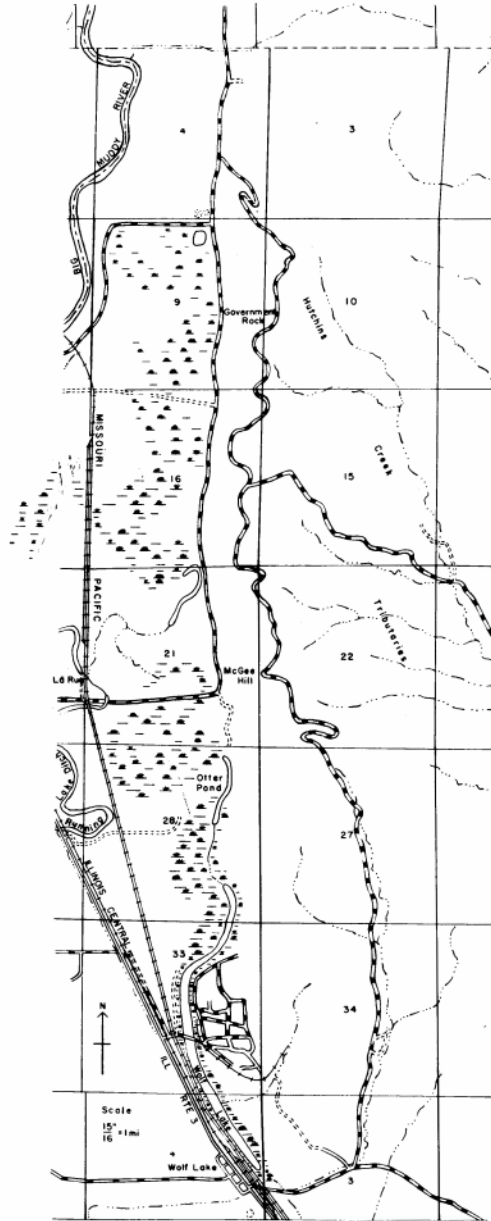


Fig. 1 The Pine Hills-Wolf Lake-La Rue Swamp Complex.

by sign. This represents about 90% of the species believed to occur in southern Illinois. Most are represented in collections of the Cooperative Wildlife Research Laboratory and Department of Zoology, Southern Illinois University.

#### SPECIES ACCOUNTS

Because of concentration on small mammals that could be trapped with Museum Special traps and certain other species which were being emphasized in specific research interests, these accounts reflect inequities in emphasis. Also, in the case of most large forms, no effort was made to collect ; only signs and/or observations were recorded.

Scientific names follow Hoffmeister and Mohr (1957) , except for the golden mouse where Hooper (1958) is preferred ; subspecific identification is excluded where there is apparent question.

#### MARSUPIALIA

*Didelphis marsupialis virginiana* Kerr. Opossum. Signs of this mammal were recorded for all habitats, with greatest activity noted in the lowland ; much of this was along the base of the bluff on the east and the Missouri Pacific railroad track on the west (Fig. 1) . Generally, the opossum was not abundant ; however, the widespread evidence of its occurrence often suggested this. Its frequency of occurrence was considerably greater from 1950 to 1956 than 1957 to 1965, suggesting a possible decline in numbers.

#### INSECTIVORA

*Blarina brevicauda carolinensis* (Bachman) . Short-tailed shrew. This shrew was the second most abundant small mammal recorded, representing 16.1% of the catch. Although an occasional specimen was collected in most sections, captures were largely in 9, 16, 21 and 28, T.11 S and 3, T.12S. The greatest number (76% of the catch) was taken in the drier woodland and open, grassy field communities of the lowlands. Compared to other years, the population seemed unusually high in 1961 ; for May through July, the 131 captures represented over 60% of the small mammal catch at that time.

*Cryptotis parva harlani* (Duvernoy) . Least shrew. Only two specimens were taken (sections 3, T.12S and 4, T.12S.) both were trapped in grassy areas of the lowlands where *Microtus* and *Peromyscus maniculatus* were also taken. Because of trapping techniques, representation of this species in the catch did not reflect its actual abundance. But it was scarce at best.

*Scalopus aquaticus machrinus* (Rafinesque). Eastern Mole. No attempts were made to collect this mole, but no section was without evidence of its activity. Sign was most prevalent in the the drier communities of the lowland, especially recently disturbed areas and the more mature woodland.

## CHIROPTERA

This listing probably does not include all forms of bats present, as the collecting was sporadic and did not reflect concentrated effort. Therefore, discussion of comparative numbers of individual forms is generalized.

The sites for daytime "roosting" were variable and quite numerous, as there were several bridges, crevices, small caves, picnic shelters, old buildings and large trees available. However, most of these sites were not typical of those frequented by colonies or large numbers of individuals. Generally, the overall number of bats using the area was small. Greatest bat activity was in the vicinity of the open water of Wolf Lake where nighttime collecting could not be conducted because of restrictions by a powder company. The species reflect the variety of habitat.

*Myotis lucifugus lucifugus* (Le Conte) . Little brown bat. This was probably the second most numerous bat. A small colony was reported in an unused warehouse of the powder company adjacent to Wolf Lake but was evicted in 1957. Two specimens were identified in a crevice along the bluff in Section 9, T.11S.

*Myotis keenii septentrionalis* (Trouessart) . Keen's bat. —A single specimen was collected from the railroad bridge in Section 21, T.11S.

*Myotis sodalis* Miller and G. M. Allen. Indiana bat. Two specimens were shot at the levee along the west side of Section 9, T.11 S.

*Pipistrellus sub flavus sub flavus* (F. Cuvier) . Eastern pipistrelle. This was by far the most numerous bat in the area, probably representing over 75% of those recorded at night. A barn in Section 4, T.11S. and an unoccupied house in Section 15, T.11S. yielded several specimens.

*Lasionycteris noctivagans* (Le Conte) . Silver-haired bat. Three silver-haired bats were identified in hollow trees in sections 16 and 21 while checking for wood duck nests in 1956.

*Eptesicus fuscus fuscus* (Palisot de Beauvois) . Big brown bat. On eight occasions individual big browns were identified in evening flight and two were observed in a barn in Section 4, T.11S.

*Lasiurus borealis borealis* (Muller) . Red bat. One female red bat with one young was found hanging from the branch of a tree along the base of the bluff in Section 9, T.11S.

*Nycticeius humeralis humeralis* (Rafinesque) . Twilight bat. This bat was believed the third most abundant, based on evening flights. A small colony utilized the belfry of an old school house in Section 4, T.11S.

## LAGOMORPHA

Two forms of lagomorphs were present in all sections except 22, T.11S. Over 90% of the occurrences were confined to the lowlands.

As collecting efforts were limited, much of the evidence of the two species was based on sign and sightings.

*Sylvilagus floridanus* (J. A. Allen) . Cottontail. There were infrequent occurrences except in and adjacent to right-of-ways and the drier lowland areas of grasses and shrubs. Sections 4, 9, 16, 21 and 28, T.11 S. and 3, T.12S. yielded 84% of the observations.

*Sylvilagus aquaticus aquaticus* (Bachman) . Swamp rabbit. Sign of this species was limited to the lowland adjacent to the bluff except for one record in Section 3, T.12S. along a canebrake strip near the exit of an intermittent stream from the hill area. All lowland sections yielded occasional sign, such as droppings on logs and stumps in moist soil and inundated areas ; however, greatest activity was recorded along the west sides of sections 16, 21 and 28, T.11 S. Seemingly, the population was the highest during the fall and winter of 1959-60 when 78% of all occurrences were recorded. However, this species must be regarded as being generally uncommon.

#### RODENTIA

As there was special emphasis on trapping all types of habitats for mammals subject to capture by the Museum Special, the records for small rodents are considered highly representative. Except for the woodrat and beaver, both subjected to special study, other large rodents are not so completely and precisely recorded.

*Marmota monax monax* (Linnaeus) . Woodchuck. Greatest activity was evidenced along the west-facing slope of the bluff in sections 4, 9, 16, 21, 28 and 33, T.11 S. Layne (1958 :235) reported them particularly abundant along the wooded bluffs of Pine Hills. They were noted in all sections, with many burrows recorded along the Missouri Pacific railroad right-of-way.

*Tamias striatus* (Linnaeus) . Eastern chipmunk. Although recorded for every section, the chipmunk was most prevalent in those where rock outcrops and crevices were in association with the larger and more mature, mast-producing trees. Their occurrence suggested a close association with *Neotoma*. The data indicate a general increase in population levels during the 16-year period. This was especially apparent during the early 1960's when over 55% of the observations were recorded.

*Sciurus carolinensis carolinensis* Gmelin. Gray squirrel. This species was recorded in all sections but showed most activity in those containing the greatest quantity of mature, mast-producing trees. Limited analysis of hunter harvest indicated a 3 :1 ratio of gray to fox squirrels. Mature bottomland woods of sections 21 and 28 and upland woods of sections 10, 15, 27 and 34, T.11 S., bisected by streams, were favorite areas, as evidenced by hunter activities.

*Sciurus niger rufiventer* E. Geoffroy-Saint-Hilaire. Fox squirrel. Ninety-two percent of the fox squirrels recorded were observed in the lowlands, including all sections. But the population was dispersed, rarely showing centers of activity, and was never considered high.

*Gaucomys volans volans* (Linnaeus) . Eastern flying squirrel. Only two observations were made (Section 21, T.11 S.) , a reasonable reflection of its prevalence. Most of the upland was devoid of desirable habitat, as acceptable den trees were lacking. Although the lowland, where two were recorded, yielded a limited number of den trees, few were considered suitable for flying squirrels.

*Castor canadensis* Kuhl. Beaver. The beaver population was increased by reintroduction in October, 1938, when one male and two females were released in La Rue Swamp (Mohr, 1943) . The U.S. Forest Service in 1947 reported eight active houses and a possible population of 40 beavers (Pietsch, 1956) as a result of this initial release. Because the Forest Service holdings did not include sections 28 and 34, T.11 S. and 3, T.12S., the 1947 population does not reflect the entire lowland of the ecological complex included in this species account.

Records of the Illinois Department of Conservation, U.S. Forest Service and personal research suggest that this beaver population reached peak levels in 1952 and 1953. During 1954 and 1955 there was a slight decline, but in 1956 a sharp decline occurred, with a population slightly more than one-half that of peak years. Since 1957, the population appears to have stabilized at around 35 to 40 animals. It is believed that this decline reflects a deterioration of habitat, largely due to the lack of food and further opportunities to enhance the supply.

*Peromyscus maniculatus bairdii* ( Hoy and Kennicott) . Prairie deer mouse. This species was the fourth most prevalent small mammal, representing 12.7% of the total catch. Approximately 83% of the captures were in the lowlands, primarily in sections 4, 9 and 28, T.11 S. and 3, T.12S. Location of captures showed association either with agricultural land use, early stages in succession to mature forest, or openings in the more mature forest communities. No individual sites indicated strong populations, but the more nearly the land use indicated recent agriculture, the higher the population. Trapping records suggest that the population of this species is declining, particularly since 1959. This appears to be associated with the reversion of previously cleared areas to woodland.

*Peromyscus leucopus leucopus* (Rafinesque) . White-footed mouse. The white-footed mouse is the small mammal which most nearly exemplifies the forest-dominated environments of this area. This mouse yielded **41.9%** of all the captures and occurred in all sections, although about 68% of the captures were in the lowlands. While clearly associated

with woodland habitat, its versatility was evidenced by captures in every community except open water. However, it was taken on logs and stumps in areas inundated by beaver.

*Ochrotomys nuttalli aureolus* (Audubon and Bachman). Golden mouse. This mouse, which is an arboreal nester, primarily, represented slightly over 2% of the catch. The locations of capture showed clear relationship with either canebrakes or vine entanglements in trees. Specimens were taken in the lowland portion of sections 9, 16 and 21, T.11S. and in 3, T.12S. Eleven nests in grape vines and catbrier were observed ; seven were active at the time examined. Availability of acceptable nesting sites probably restricts the population level and distribution of the golden mouse in this area.

*Neotoma floridana illinoensis* A. H. Howell. Eastern woodrat. Sign of woodrats was recorded for the west face of the bluff up to elevations of about 500 feet, and for certain portions of the immediately adjacent lowlands in sections 4, 9, 16, 21, 28 and 33, T.11S. Sections 9, 16 and 21 probably supported about 85% of the woodrat population. Most sites of activity were located at or near rock formations, with preference for the base of these formations. A few nest sites were located in vine-entangled canopies of trees in the adjacent lowland woods.

Only two other populations of woodrats occur in Illinois ; one at Horseshoe Bluff, about 3.5 miles north of Pine Hills, and Fountain Bluff, about 7 miles across flood plain to the northwest. These populations are small and occupy limited areas.

It is apparent that the Pine Hills population has been declining for some time. Howell (1910) reported woodrats common along the bluffs east of Wolf Lake ; our studies in 1959-62 showed only five active house sites in this 2-mile section. A retired employee of an industry located on the east side of Wolf Lake reported that woodrats once infested warehouses, but company officials indicated this has not occurred in many years. During a 2-year study of the Pine Hills population, about 30% of the houses were not occupied, only three new ones were constructed, and many seemingly suitable locations for houses were not utilized.

*Synaptomys cooperi gossii* (Coues) . Bog lemming. This mouse appeared in slightly more than 0.2% of the catch ; all were taken in low, wet, grassy areas in sections 9 and 16, T.11S. This species fails to be strongly represented in most small mammal trapping in southern Illinois.

*Microtus ochrogaster ochrogaster* (Wagner) . Prairie vole. The prairie vole ranked third in total captures, representing 15.8% of the catch. Most were taken in either grassy areas (such as the levee in Section 9, T.11S.), a small agricultural area in Section 3, T.12S., or

on right-of-ways subject to periodic vegetation control. All sections were included, except 3, 10, and 22, T.11S. Populations of this species fluctuated drastically, as captures varied as much as 87% between individual years; 1960 showed 48% of all catches for the 16-year period.

*Pitymys pinetorum auricularis* (Bailey) . Pine mouse. This mouse yielded only 0.6% of the catch. All representatives were taken in plant communities showing a combination of grass and shrubs. Captures were made in the lowlands of sections 9, 16 and 28, T.11S.

*Oryzomys palustris palustris* (Harlan) . Rice rat. This little-known mammal has not been recorded previously from this area. It contributed slightly over 1 % of the catch and was taken near the Missouri Pacific railroad in wet, marshy portions of sections 16 and 21, T.11S. No captures were made after October, 1958.

*Ondatra zibethicus zibethicus* (Linnaeus) . Muskrat. This furbearer occurred in all sections of the lowlands but was nowhere abundant. The largest numbers appeared to be in Wolf Lake and Otter Pond. Populations of the La Rue Swamp were always low and seemed most concentrated in Section 16. Most were bank dwellers, although occasionally two or three houses appeared at the upper end of Wolf Lake ; an abandoned beaver lodge was used in one instance in La. Rue Swamp.

*Rattus novegicus* (Berkenhout) . Norway rat. Two animals were live-trapped on the bluff east of the residence located on the section line between 21 and 28, T.11S. This seemed a clear association with human living quarters; feral populations did not appear to exist.

*Mus musculus domesticus* Ratty. House mouse. Feral populations of this mouse seemed associated largely with lowland habitats (89% of catch) exhibiting at least some grass. The house mouse contributed 8.6% of the captures and was taken in all sections except 3, T.11S.

*Zapus hudsonius intermedius* Krutzsch. Meadow jumping mouse. This mouse, yielding 0.7% of the catch, was taken in sections 16 and 21, T.11S. and 4, T.12S. All captures were in marshy woodland habitat.

#### CARNIVORA

*Canis latrans* Say. Coyote. —A trapper from Grand Tower reported shooting a "coyote" near the levee in Section 9, T.11S. on February 8, 1954 while running traps in La Rue Swamp. The specimen was not available for verification but was reported to have been identified by a biologist of the Illinois Department of Conservation.

*Vulpes fulva fulva* (Desmarest) . Red fox. This species was recorded sporadically and only in the lowlands, but including all sections.

*Urocyon cinereoargenteus cinereoargenteus* (Schreber). Gray fox. The activities of this fox were widely evident in the entire area but it was obviously more an inhabitant of the upland than the lowland.



One active den was located along a stream in Section 27, T.11S. in 1954, and another in a similar site of Section 10, T.11S. in 1957.

*Procyon lotor lotor* (Linnaeus) . Raccoon. This was unquestionably the most numerous carnivore. Although occurring in all sections of the area, it was most prominent in the wooded lowlands and along the lower levels of the adjacent bluffs, where it lived in rather close association with *Neotoma*, *Tamias*, *Marmota* and *Didelphis*. The population of the raccoon seemed somewhat depressed from 1958 to 1961 as compared to other years. Five litters (4, 4, 2, 3, 3) were recorded ; three in hollow trees and two in crevices.

*Mustela frenata noveboracensis* (Emmons) . Long-tailed weasel. Tracks were noted following a snowfall on a beaver dam in Section 21, T.11S. This infrequently-recorded mammal is probably more numerous than records suggest.

*Mustela vison mink* Peale and Palisot de Beauvois. Mink. Sign suggested this species occurred in all sections but was most prevalent in the lowlands, especially sections 16, 21 and 28, T.11S. Trappers' records indicate that it is not abundant.

*Mephitis mephitis nigra* Peale and Palisot de Beauvois. Striped skunk. The skunk was recorded from only sections 4, 9, 16 and 21, T.11S. but it probably occurs in all other lowland areas, as well as much of the upland. Data suggest peak numbers occurred at about 5 to 6 year intervals. The fall of 1959 seemed unusually high. Nine sightings were recorded one night along the road at the base of the bluff in the above sections.

*Lynx rufus rufus* (Schreber) . Bobcat. Tracks of this mammal were observed in snow, February, 1960, on the west side of the levee in Section 9, T.11S., adjacent to Big Muddy River. This rare animal probably travels and hunts the wooded lowlands of major drainages.

#### ARTIODACTYLA

*Odocoileus virginianus borealis* Miller. White-tailed deer. First evidence of deer was recorded in 1953 ; subsequently, sign has continued to increase, suggesting population increment. Most activity has been in the upland sections.

#### ACKNOWLEDGEMENTS

Many members of the Cooperative Wildlife Research Laboratory and mammalogy classes under my direction contributed to this publication. Each person cannot be identified ; however, the efforts of John Crim, Earl Stadelbacher, Max Hutchison, Larry Calbert, Lawrence Blus, Dale Birkenholz, Ronald Yates, Donald Hankla, William Carter, Ralph Dimmick, Walter Stieglitz, Thomas Jenssen, Charles Pils, Floyd Sandford, and John Oberheu bear particular recognition.

This is a contribution from Project No. 45, Cooperative Wildlife

Research Laboratory, Southern Illinois University. A portion of the data represent research on the Pine Hills Field Station.

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